DRINKING WATER SURVEILLANCE PROGRAM

TECUMSEH WATER TREATMENT PLANT

ANNUAL REPORT 1990

Ontario
Environment
Environnement

ISSN 1183-6210

TECUMSEH
WATER TREATMENT PLANT

DRINKING WATER SURVEILLANCE PROGRAM

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JULY 1992

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EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

TECUMSEH WATER TREATMENT PLANT
1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Tecumseh water treatment plant is a conventional treatment plant which treats water from Lake St. Clair. The process consists of coagulation, flocculation, clarification (upflow solids contact clarifier), filtration, taste and odour control and disinfection. This plant has a rated capacity of 15.0 x 1000 m^3/day. The Tecumseh water treatment plant serves a population of approximately 15,000.

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

No known health related guidelines were exceeded.

The Tecumseh water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

TABLE A

DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

	SCAN	SITE RAW TESTS	POSITIVE	%POSITIVE	TREATED TESTS	POSITIVE	%POSITIVE	SITE 1 TESTS	POSITIVE	%POSITIVE	SITE 2 TESTS	POSITIVE	%POSITIVE
	BACTERIOLOGICAL	24	16	66	8	0	0	7	1	14	7	1	14
	CHEMISTRY (FLD)	23	23	100	47	47	100	78	75	96	78	76	97
	CHEMISTRY (LAB)	176	152	86	174	122	70	243	204	83	245	210	85
	METALS	192	68	35	192	49	25	299	110	36	299	117	39
	CHLOROAROMATICS	112	0	0	98	0	0	98	0	0	84	0	0
	CHLOROPHENOLS	12	0	0	12	0	0	.	.	.	.	.	.
	PAH	135	0	0	119	0	0	17	0	0	17	0	0
	PESTICIDES & PCB	273	0	0	252	0	0	149	0	0	128	0	0
	PHENOLICS	7	0	0	8	0	0	.	.	.	.	.	.
	SPECIFIC PESTICIDES	59	0	0	50	0	0	7	0	0	6	0	0
	VOLATILES	232	0	0	232	32	13	203	28	13	203	28	13
TOTAL		1245	259		1192	250		1101	418		1067	432	

DRINKING WATER SURVEILLANCE PROGRAM

TECUMSEH WATER TREATMENT PLANT
1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Tecumseh water treatment plant in the spring of 1990. This is the first DWSP annual report.

PLANT DESCRIPTION

The Tecumseh water treatment plant is a conventional treatment plant which treats water from Lake St. Clair. The process consists of coagulation, flocculation, clarification (upflow solids contact clarifier), filtration, taste and odour control and disinfection. This plant has a rated capacity of 15.0 x 1000 m^3/day. The Tecumseh water treatment plant serves a population of approximately 15,000.

The sample day flows ranged from 5.6 x 1000 m^3/day to 11.4 x 1000 m^3/day.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing samples therefore, were General Chemistry and Metals. The free flow

sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were reported above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of

the soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 13 of 22 treated and distributed water samples with a maximum reported value of 23.5°C.

CHEMISTRY (LAB)

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and would possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Aesthetic or Recommended Operational Guideline of 80-100 mg/L in 22 of 22 treated and distributed water samples with a maximum reported value of 149.7 mg/L.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to indicate the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant, to avoid problems in the distribution system.

Aluminum exceeded the ODWO Aesthetic or Recommended Operational Guideline of 100 ug/L in 1 of 22 treated and distributed water samples with a maximum reported value of 110.0 ug/L.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatic scan showed that none were detected above trace levels.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected.

PESTICIDES & PCB

The results of the PCB scan showed that none were detected.

The results of the regular pesticide scan showed that none were detected above trace levels.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results were reported above trace levels.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in the 22 treated and distributed water samples analyzed with a maximum level of 68.3 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

CONCLUSIONS

The Tecumseh water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

No known health related guidelines were exceeded.

FIGURE 1

TECUMSEH WATER TREATMENT PLANT

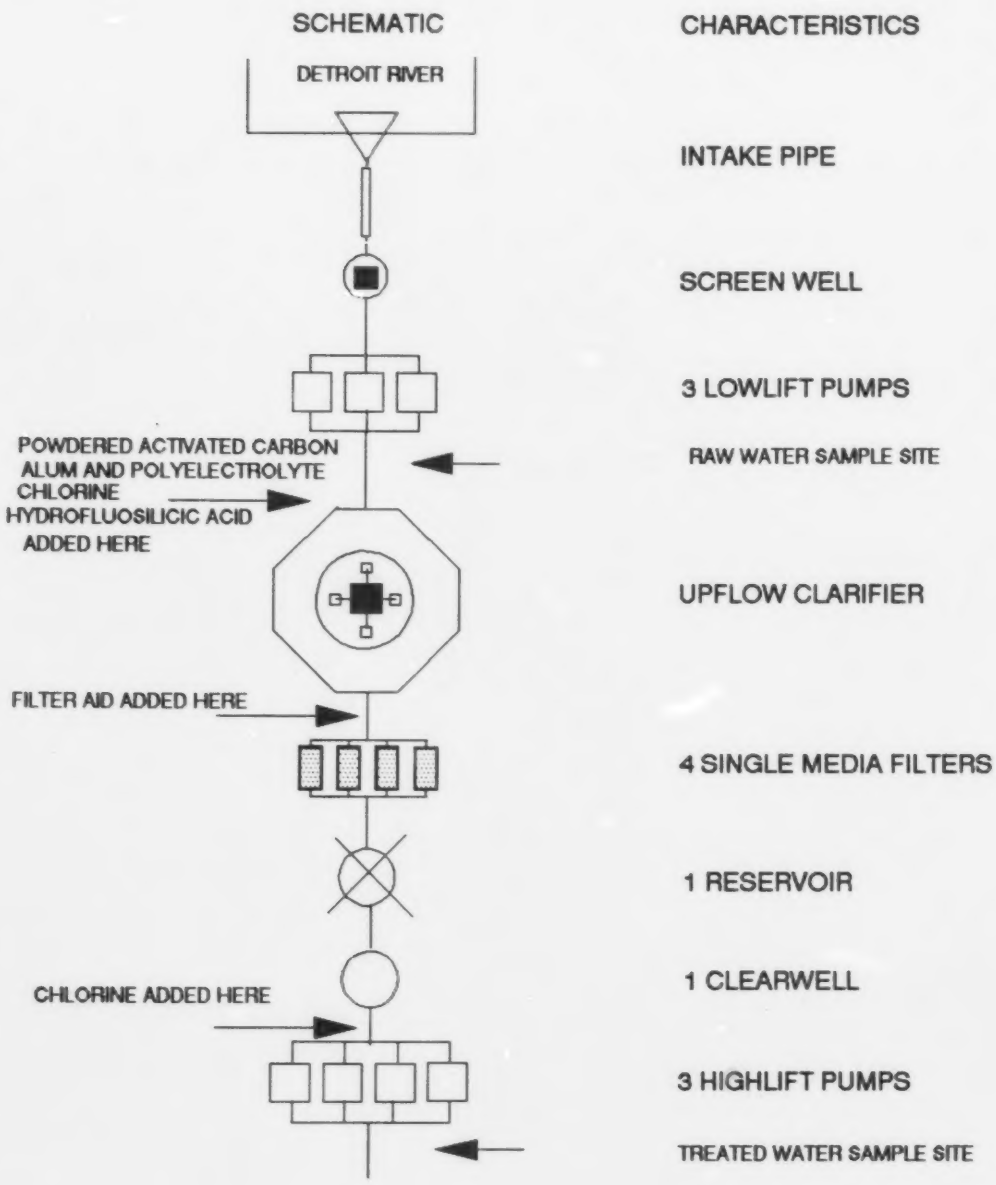

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM

PLANT GENERAL REPORT

WORKS #: 220003314
PLANT NAME: TECUMSEH WTP

DISTRICT: WINDSOR
REGION: SOUTHWEST
DISTRICT OFFICER :J. DRUMMOND

UTM #: -

PLANT SUPERINTENDENT: GARY DUNMORE

ADDRESS: 9725 RIVERSIDE DRIVE EAST
WINDSOR,ONTARIO
N8P 1A2
(519 735 3001)

MUNICIPALITY: TECUMSEH
AUTHORITY: PROVINCIAL

PLANT INFORMATION

PLANT VOLUME:	4.546	(X 1000 M3)
DESIGN CAPACITY:	18.180	(X 1000 M3/DAY)
RATED CAPACITY:	15.000	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
SANDWICH SOUTH	-
ST CLAIR BEACH	-
TECUMSEH	15,000

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER	LOCATION	FREQUENCY
ALUMINUM	TREATED WATER	WEEKLY
FREE CHLORINE RESIDUAL	AFTER FILTERS	DAILY
	TREATED WATER	EVERY 8 HOURS
TOTAL CHLORINE RESIDUAL	TREATED WATER IN LAB	CONTINUOUS
	TREATED WATER	EVERY 8 HOURS
FLUORIDE	AFTER CLARIFIERS	EVERY 4 HOURS
	TREATED WATER	EVERY 4 HOURS
PH	RAW WATER	EVERY 8 HOURS
	TREATED WATER	EVERY 8 HOURS
TEMPERATURE	RAW WATER	EVERY 8 HOURS
TURBIDITY	AFTER CLARIFIERS	EVERY 2 HOURS
	AFTER FILTERS	EVERY 2 HOURS
	RAW WATER IN LAB	EVERY 2 HOURS
	TREATED WATER	EVERY 2 HOURS

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP SAMPLE DAY CONDITIONS FOR 1990

			TREATMENT CHEMICAL DOSAGES (MG/L)					
			PRE CHLORINATION	POST CHLORINATION	COAGULATION	COAGULATION AID	TASTE & ODOUR	FILTER AID
			CHLORINE	CHLORINE	ALUM LIQUID	POLYELECTROLYTE	ACTIVATED CARBON POWDER	POLYELECTROLYTE
DATE	DELAY * TIME(HRS)	FLOW (1000M3)						
MAY 22	.30	7.430	1.00	.80	20.00	.15		
JUN 19	13.87	8.246	1.65	.80	15.00	.10		
JUL 17	8.00	11.290	2.93	.91	15.00	.15	2.00	.15
AUG 28	13.00	11.486	1.73	.97	19.30		5.00	.20
SEP 20	12.00	11.365	2.40	.85	20.00		5.00	.20
OCT 18	14.00	7.793	2.45	.69	15.00	.20	1.00	.20
NOV 20	16.00	6.818	1.58	.97	20.00			.20
DEC 18	19.50	5.637	.95	.75	20.00			.20

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL												
FECAL COLIFORM MF	8	4	0	.	.	.	.	.	.	.	.	.
STANDRD PLATE CNT MF	.	.	.	8	0	0	7	1	0	7	1	0
TOTAL COLIFORM MF	8	4	0	.	.	.	.	.	.	.	.	.
T COLIFORM BCKGRD MF	8	8	0	.	.	.	.	.	.	.	.	.
*TOTAL GROUP BACTERIOLOGICAL	24	16	0	8	0	0	7	1	0	7	1	0
CHEMISTRY (FLD)												
FLD CHLORINE (COMB)	.	.	.	8	8	0	13	10	0	13	11	0
FLD CHLORINE FREE	.	.	.	8	8	0	13	13	0	13	13	0
FLD CHLORINE (TOTAL)	.	.	.	8	8	0	13	13	0	13	13	0
FLD PH	7	7	0	7	7	0	13	13	0	13	13	0
FLD TEMPERATURE	8	8	0	8	8	0	13	13	0	13	13	0
FLD TURBIDITY	8	8	0	8	8	0	13	13	0	13	13	0
*TOTAL SCAN CHEMISTRY (FLD)	23	23	0	47	47	0	78	75	0	78	76	0
CHEMISTRY (LAB)												
ALKALINITY	8	8	0	8	8	0	13	13	0	13	13	0
CALCIUM	8	8	0	8	8	0	13	12	0	13	13	0
CYANIDE	8	0	0	8	0	0	.	.	.	.	.	.
CHLORIDE	8	8	0	8	8	0	13	13	0	13	13	0
COLOUR	8	3	4	8	0	5	13	1	4	13	0	7
CONDUCTIVITY	8	8	0	8	8	0	13	13	0	13	13	0
DISS ORG CARBON	8	7	1	8	8	0	13	13	0	13	13	0
FLUORIDE	8	8	0	8	8	0	13	12	0	13	13	0
HARDNESS	8	8	0	8	8	0	13	12	0	13	13	0
IONCAL	8	8	0	8	8	0	13	13	0	13	13	0
LANGELIERS INDEX	8	8	0	6	6	0	9	9	0	11	11	0
MAGNESIUM	8	8	0	8	8	0	13	12	0	13	13	0
SODIUM	8	8	0	8	8	0	13	13	0	13	13	0
AMMONIUM TOTAL	8	4	2	8	0	4	13	3	5	13	2	6
NITRITE	8	6	2	8	0	3	13	1	11	13	3	7
TOTAL NITRATES	8	8	0	8	8	0	13	13	0	13	13	0
NITROGEN TOT KJELD	8	8	0	8	6	2	13	13	0	13	13	0
PH	8	8	0	8	8	0	13	13	0	13	13	0
PHOSPHORUS FIL REACT	8	4	4	8	0	3	.	.	.	.	.	.
PHOSPHORUS TOTAL	8	8	0	8	0	3	.	.	.	.	.	.
SULPHATE	8	8	0	8	8	0	13	13	0	13	13	0
TURBIDITY	8	8	0	8	6	2	13	12	1	13	12	1
*TOTAL SCAN CHEMISTRY (LAB)	176	152	13	174	122	22	243	204	21	245	210	21

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
METALS												
SILVER	8	0	0	8	0	0	13	0	0	13	0	0
ALUMINUM	8	8	0	8	8	0	13	13	0	13	13	0
ARSENIC	8	0	8	8	0	8	13	0	11	13	0	13
BARIUM	8	8	0	8	8	0	13	12	1	13	13	0
BORON	8	6	2	8	6	2	13	11	2	13	10	3
BERYLLIUM	8	0	1	8	0	0	13	0	1	13	0	2
CADMIUM	8	0	0	8	0	1	13	0	4	13	0	3
COBALT	8	0	8	8	0	8	13	0	12	13	0	11
CHROMIUM	8	0	8	8	0	8	13	0	13	13	0	12
COPPER	8	0	8	8	0	7	13	8	5	13	10	3
IRON	8	8	0	8	0	2	13	0	3	13	0	10
MERCURY	8	0	1	8	0	0	.	.	.	.	.	.
MANGANESE	8	8	0	8	3	5	13	5	8	13	13	0
MOLYBDENUM	8	5	3	8	8	0	13	13	0	13	13	0
NICKEL	8	0	8	8	0	6	13	3	9	13	2	9
LEAD	8	2	6	8	0	4	13	7	6	13	10	3
ANTIMONY	8	1	7	8	2	6	13	8	5	13	4	9
SELENIUM	8	0	1	8	0	3	13	0	8	13	0	10
STRONTIUM	8	8	0	8	8	0	13	12	1	13	13	0
TITANIUM	8	3	5	8	0	8	13	0	13	13	0	13
THALLIUM	8	0	0	8	0	0	13	0	0	13	0	0
URANIUM	8	1	7	8	0	8	13	0	10	13	0	12
VANADIUM	8	5	3	8	5	3	13	7	6	13	4	9
ZINC	8	5	3	8	1	7	13	11	2	13	12	1
*TOTAL SCAN METALS	192	68	79	192	49	86	299	110	120	299	117	123
*TOTAL GROUP INORGANIC & PHYSICAL	391	243	92	413	218	108	620	389	141	622	403	144
CHLOROAROMATICS												
HEXACHLOROBUTADIENE	8	0	0	7	0	0	7	0	0	6	0	0
123 TRICHLOROBENZENE	8	0	0	7	0	0	7	0	0	6	0	0
1234 T-CHLOROBENZENE	8	0	0	7	0	0	7	0	0	6	0	0
1235 T-CHLOROBENZENE	8	0	0	7	0	0	7	0	0	6	0	0
124 TRICHLOROBENZENE	8	0	0	7	0	0	7	0	0	6	0	0
1245 T-CHLOROBENZENE	8	0	0	7	0	0	7	0	0	6	0	0
135 TRICHLOROBENZENE	8	0	0	7	0	0	7	0	0	6	0	0
HCB	8	0	0	7	0	0	7	0	0	6	0	0
HEXACHLOROETHANE	8	0	0	7	0	1	7	0	1	6	0	1
OCTACHLOROSTYRENE	8	0	0	7	0	0	7	0	0	6	0	0
PENTACHLOROBENZENE	8	0	0	7	0	0	7	0	0	6	0	0
236 TRICHLOROTOLUENE	8	0	0	7	0	0	7	0	0	6	0	0
245 TRICHLOROTOLUENE	8	0	0	7	0	0	7	0	0	6	0	0
26A TRICHLOROTOLUENE	8	0	0	7	0	0	7	0	0	6	0	0
*TOTAL SCAN CHLOROAROMATICS	112	0	0	98	0	1	98	0	1	84	0	1
CHLOROPHENOLS												

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
234 TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
2345 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
2356 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
245-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
246-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
PENTACHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
*TOTAL SCAN CHLOROPHENOLS	12	0	0	12	0	0	0	0	0	0	0	0
PAH												
PHENANTHRENE	8	0	0	7	0	0	1	0	0	1	0	0
ANTHRACENE	8	0	0	7	0	0	1	0	0	1	0	0
FLUORANTHENE	8	0	0	7	0	0	1	0	0	1	0	0
PYRENE	8	0	0	7	0	0	1	0	0	1	0	0
BENZO(A)ANTHRACENE	8	0	0	7	0	0	1	0	0	1	0	0
CHRYSENE	8	0	0	7	0	0	1	0	0	1	0	0
DIMETH. BENZ(A)ANTHR	7	0	0	7	0	0	1	0	0	1	0	0
BENZO(E) PYRENE	8	0	0	7	0	0	1	0	0	1	0	0
BENZO(B) FLUORANTHEN	8	0	0	7	0	0	1	0	0	1	0	0
PERYLENE	8	0	0	7	0	0	1	0	0	1	0	0
BENZO(K) FLUORANTHEN	8	0	0	7	0	0	1	0	0	1	0	0
BENZO(A) PYRENE	8	0	0	7	0	0	1	0	0	1	0	0
BENZO(G,H,I) PERYLEN	8	0	0	7	0	0	1	0	0	1	0	0
DIBENZO(A,H) ANTHRAC	8	0	0	7	0	0	1	0	0	1	0	0
INDENO(1,2,3-C,D) PY	8	0	0	7	0	0	1	0	0	1	0	0
BENZO(B) CHRYSENE	8	0	0	7	0	0	1	0	0	1	0	0
CORONENE	8	0	0	7	0	0	1	0	0	1	0	0
*TOTAL SCAN PAH	135	0	0	119	0	0	17	0	0	17	0	0
PESTICIDES & PCB												
ALDRIN	8	0	0	7	0	0	7	0	0	6	0	0
ALPHA BHC	8	0	4	7	0	2	7	0	3	6	0	3
BETA BHC	8	0	0	7	0	0	7	0	0	6	0	0
LINDANE	8	0	1	7	0	0	7	0	1	6	0	1
ALPHA CHLORDANE	8	0	0	7	0	0	7	0	0	6	0	0
GAMMA CHLORDANE	8	0	0	7	0	0	7	0	0	6	0	0
DIELDRIN	8	0	0	7	0	0	7	0	0	6	0	0
METHOXYCHLOR	8	0	0	7	0	0	7	0	0	6	0	0
ENDOSULFAN 1	8	0	0	7	0	0	7	0	0	6	0	0
ENDOSULFAN II	8	0	0	7	0	0	7	0	0	6	0	0
ENDRIN	8	0	0	7	0	0	7	0	0	6	0	0
ENDOSULFAN SULPHATE	8	0	0	7	0	0	7	0	0	6	0	0
HEPTACHLOR EPOXIDE	8	0	0	7	0	0	7	0	0	6	0	0
HEPTACHLOR	8	0	0	7	0	0	7	0	0	6	0	0
MIREX	8	0	0	7	0	0	7	0	0	6	0	0
OXYCHLORDANE	8	0	0	7	0	0	7	0	0	6	0	0
OPDDT	8	0	0	7	0	0	7	0	0	6	0	0
PCB	8	0	0	7	0	0	7	0	0	6	0	0
DDD	8	0	0	7	0	0	7	0	0	6	0	0
PPDDE	8	0	0	7	0	0	7	0	0	6	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PPDDT	8	0	0	7	0	0	7	0	0	6	0	0
AMETRINE	8	0	0	8	0	0	.	.	.	.	.	.
ATRAZINE	8	0	4	8	0	3	.	.	.	.	.	.
ATRATONE	8	0	0	8	0	0	.	.	.	.	.	.
CYANAZINE (BLADEX)	8	0	0	8	0	0	.	.	.	.	.	.
DESETHYLATRAZINE	8	0	0	8	0	0	.	.	.	.	.	.
D-ETHYL SIMAZINE	6	0	0	6	0	0	.	.	.	.	.	.
PROMETONE	8	0	0	8	0	0	.	.	.	.	.	.
PROPAZINE	8	0	0	8	0	0	.	.	.	.	.	.
PROMETRYNE	8	0	0	8	0	0	.	.	.	.	.	.
METRIBUZIN (SENCOR)	8	0	0	8	0	0	.	.	.	.	.	.
SIMAZINE	8	0	0	8	0	0	.	.	.	.	.	.
ALACHLOR (LASSO)	8	0	0	8	0	0	.	.	.	.	.	.
METOLACHLOR	8	0	0	8	0	0	.	.	.	.	.	.
HEXACLCYCLOPENTADIEN	3	0	0	3	0	1	2	0	0	2	0	0
*TOTAL SCAN PESTICIDES & PCB	273	0	9	252	0	6	149	0	4	128	0	4
PHENOLICS												
PHENOLICS	7	0	4	8	0	3	.	.	.	.	.	.
*TOTAL SCAN PHENOLICS	7	0	4	8	0	3	0	0	0	0	0	0
SPECIFIC PESTICIDES												
TOXAPHENE	8	0	0	7	0	0	7	0	0	6	0	0
2,4,5-T	2	0	0	2	0	0	.	.	.	.	.	.
2,4-D	2	0	0	2	0	0	.	.	.	.	.	.
2,4-DB	2	0	0	2	0	0	.	.	.	.	.	.
2,4 D PROPIONIC ACID	2	0	0	2	0	0	.	.	.	.	.	.
DICAMBA	2	0	0	2	0	0	.	.	.	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.	.	.	.
SILVEX	2	0	0	2	0	0	.	.	.	.	.	.
DIAZINON	2	0	0	2	0	0	.	.	.	.	.	.
DICHLOROVOS	2	0	0	2	0	0	.	.	.	.	.	.
CHLORPYRIFOS	2	0	0	2	0	0	.	.	.	.	.	.
ETHION	2	0	0	2	0	0	.	.	.	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.	.	.	.
MALATHION	2	0	0	2	0	0	.	.	.	.	.	.
MEVINPHOS	2	0	0	2	0	0	.	.	.	.	.	.
METHYL PARATHION	2	0	0	2	0	0	.	.	.	.	.	.
METHYLTRITHION	2	0	0	2	0	0	.	.	.	.	.	.
PARATHION	2	0	0	2	0	0	.	.	.	.	.	.
PHORATE	1	0	0	1	0	0	.	.	.	.	.	.
RELDAN	2	0	0	2	0	0	.	.	.	.	.	.
RONNEL	2	0	0	2	0	0	.	.	.	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.	.	.	.
BENOMYL	0	0	0	0	0	0	.	.	.	.	.	.
BUX	0	0	0	0	0	0	.	.	.	.	.	.
CARBOFURAN	2	0	0	1	0	0	.	.	.	.	.	.
CICP	2	0	0	1	0	0	.	.	.	.	.	.
DIALLATE	2	0	0	1	0	0	.	.	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
EPTAM	2	0	0	1	0	0	.	.	.	.	.	.
IPC	2	0	0	1	0	0	.	.	.	.	.	.
PROPOXUR	2	0	0	1	0	0	.	.	.	.	.	.
CARBARYL	2	0	0	1	0	0	.	.	.	.	.	.
BUTYLATE	2	0	0	1	0	0	.	.	.	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES	59	0	0	50	0	0	7	0	0	6	0	0
VOLATILES												
BENZENE	8	0	0	8	0	1	7	0	1	7	0	1
TOLUENE	8	0	0	8	0	3	7	0	3	7	0	2
ETHYLBENZENE	8	0	0	8	0	6	7	0	2	7	0	1
P-XYLENE	8	0	0	8	0	0	7	0	0	7	0	0
M-XYLENE	8	0	0	8	0	0	7	0	0	7	0	0
O-XYLENE	8	0	0	8	0	0	7	0	0	7	0	0
STYRENE	8	0	0	8	0	0	7	0	1	7	0	0
1,1 DICHLOROETHYLENE	8	0	0	8	0	0	7	0	0	7	0	0
METHYLENE CHLORIDE	8	0	0	8	0	0	7	0	0	7	0	0
T1,2DICHLOROETHYLENE	8	0	0	8	0	0	7	0	0	7	0	0
1,1 DICHLOROETHANE	8	0	0	8	0	0	7	0	0	7	0	0
CHLOROFORM	8	0	8	8	8	0	7	7	0	7	7	0
111, TRICHLOROETHANE	8	0	2	8	0	0	7	0	0	7	0	0
1,2 DICHLOROETHANE	8	0	0	8	0	0	7	0	0	7	0	0
CARBON TETRACHLORIDE	8	0	0	8	0	1	7	0	1	7	0	1
1,2 DICHLOROPROPANE	8	0	0	8	0	0	7	0	0	7	0	0
TRICHLOROETHYLENE	8	0	0	8	0	0	7	0	0	7	0	0
DICHLOROBROMOMETHANE	8	0	3	8	8	0	7	7	0	7	7	0
112 TRICHLOROETHANE	8	0	0	8	0	0	7	0	0	7	0	0
CHLORODIBROMOMETHANE	8	0	1	8	8	0	7	7	0	7	7	0
T-CHLOROETHYLENE	8	0	0	8	0	0	7	0	0	7	0	0
BROMOFORM	8	0	0	8	0	5	7	0	5	7	0	5
1122 T-CHLOROETHANE	8	0	0	8	0	0	7	0	0	7	0	0
CHLOROBENZENE	8	0	0	8	0	0	7	0	0	7	0	0
1,4 DICHLOROBENZENE	8	0	0	8	0	0	7	0	0	7	0	0
1,3 DICHLOROBENZENE	8	0	0	8	0	0	7	0	0	7	0	0
1,2 DICHLOROBENZENE	8	0	0	8	0	0	7	0	0	7	0	0
ETHLYENE DIBROMIDE	8	0	0	8	0	0	7	0	0	7	0	0
TOTL TRIHALOMETHANES	8	0	0	8	8	0	7	7	0	7	7	0
*TOTAL SCAN VOLATILES	232	0	14	232	32	16	203	28	13	203	28	10
*TOTAL GROUP ORGANIC	830	0	27	771	32	26	474	28	18	438	28	15

KEY TO TABLE 5 and 6

A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3*. AO for Total Xylenes
4. Recommended Operational Guideline

B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)

C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH

F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

I NEW YORK STATE AMBIENT WATER GUIDELINE

N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!IV	No Data: Inverted Septum
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!QU	No Data: Quality Control Unacceptable
!PE	No Data: Procedural Error Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RE	No Data: Received Empty
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
!TX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR	Unreliable: Could Not Confirm By Reanalysis
UCS	Unreliable: Contamination Suspected
UIN	Unreliable: Indeterminate Interference
XP	Positive After X Number Of Hours
T#	(T06) Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
BACTERIOLOGICAL						
FECAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 0 (A1)		
MAY	2	.	.	.	.	.
JUN	0	.	.	.	.	.
JUL	0	.	.	.	.	.
AUG	0	.	.	.	.	.
SEP	10	.	.	.	.	.
OCT	8	.	.	.	.	.
NOV	4	.	.	.	.	.
DEC	BDL	.	.	.	.	.
STANDRD PLATE CNT MF (COUNTS/ML)		DET'N LIMIT = 0		GUIDELINE = 500/ML (A3)		
MAY	.	0 <=>	.	0 <=>	.	0 <=>
JUN	.	2 <=>	.	0 <=>	.	0 <=>
JUL	.	1 <=>	.	0 <=>	.	0 <=>
AUG	.	5 <=>	.	0 <=>	.	0 <=>
SEP	.	0 <=>	.	0 <=>	.	0 <=>
OCT	.	1 <=>	.	0 <=>	.	2 <=>
NOV	.	1 <=>	.	.	.	.
DEC	.	4 <=>	.	170	.	14
TOTAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 5/100ML(A1)		
MAY	20 <=>	.	.	.	.	.
JUN	BDL	.	.	.	.	.
JUL	16	.	.	.	.	.
AUG	28	.	.	.	.	.
SEP	180	.	.	.	.	.
OCT	220	.	.	.	.	.
NOV	100 <=>	.	.	.	.	.
DEC	40 <=>	.	.	.	.	.
T COLIFORM BCKGRD MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = N/A		
MAY	7000	.	.	.	.	.
JUN	1820	.	.	.	.	.
JUL	8800	.	.	.	.	.
AUG	9600 >	.	.	.	.	.
SEP	15000	.	.	.	.	.
OCT	8800	.	.	.	.	.
NOV	1620	.	.	.	.	.
DEC	2280	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM		
	RAW	TREATED	SITE 1		SITE 2
		STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (FLD)					
FLD CHLORINE (COMB) (MG/L)		DET'N LIMIT = 0	GUIDELINE = N/A		
MAY	.	.340	.	.200	.	.200
JUN	.	.250	.400	.000	.000	.300
JUL	.	.150	.200	.200	.200	.200
AUG	.	.130	.000	.000	.100	.200
SEP	.	.160	.300	.200	.150	.400
OCT	.	.190	.400	.400	.250	.300
NOV	.	.190	.	.	.	.
DEC	.	.120	.200	.600	.000	.300
FLD CHLORINE FREE (MG/L)		DET'N LIMIT = 0	GUIDELINE = N/A		
MAY	.	.720	.	.500	.	.700
JUN	.	.690	.300	.700	.300	.400
JUL	.	.790	.500	.500	.300	.400
AUG	.	.870	.100	.700	.200	.400
SEP	.	.780	.100	.700	.150	.100
OCT	.	.830	.300	.300	.050	.200
NOV	.	.790	.	.	.	.
DEC	.	.830	.500	.300	.100	.400
FLD CHLORINE (TOTAL) (MG/L)		DET'N LIMIT = 0	GUIDELINE = N/A		
MAY	.	1.060	.	.700	.	.900
JUN	.	.940	.700	.700	.300	.700
JUL	.	.940	.700	.700	.500	.600
AUG	.	1.000	.100	.700	.300	.600
SEP	.	.940	.400	.900	.300	.500
OCT	.	1.020	.700	.700	.300	.500
NOV	.	.980	.	.	.	.
DEC	.	.950	.700	.900	.100	.700
FLD PH (DIMLESS)		DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)		
MAY	.	.	.	7.200	.	7.300
JUN	8.160	7.600	7.200	7.200	7.500	7.500
JUL	8.100	7.500	7.400	7.200	7.500	7.500
AUG	8.450	7.300	7.600	7.200	7.400	7.100
SEP	8.200	7.600	7.400	7.400	7.400	7.200
OCT	8.050	7.300	7.400	7.400	7.400	7.300
NOV	7.920	7.000	.	.	.	.
DEC	7.900	7.100	7.400	7.200	7.400	7.200
FLD TEMPERATURE (DEG.C)		DET'N LIMIT = N/A	GUIDELINE = 15 (A3)		
MAY	13.300	13.500	.	11.000	.	11.500
JUN	21.800	21.000	17.000	15.000	18.500	18.000
JUL	21.600	21.400	18.000	18.000	20.000	18.000
AUG	23.500	23.500	20.000	19.000	23.000	20.700
SEP	18.000	18.500	19.000	18.000	19.500	19.000
OCT	13.800	14.000	18.000	16.000	18.500	15.100
NOV	6.100	7.000	.	.	.	.
DEC	2.700	4.500	17.000	10.000	12.700	6.500
FLD TURBIDITY (FTU)		DET'N LIMIT = N/A	GUIDELINE = 1 (A1)		
MAY	18.600	.100	.	.160	.	.160
JUN	12.450	.110	.210	.220	.120	.120
JUL	7.940	.050	.120	.130	.310	.090
AUG	5.100	.020	.350	.190	.160	.100
SEP	9.310	.030	.130	.090	.110	.060
OCT	4.800	.080	.160	.160	.590	.170
NOV	9.000	.060	.	.	.	.
DEC	6.410	.020	.190	.290	.190	.480

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (LAB)						
ALKALINITY (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 30-500 (A3)		
MAY	88.700	78.100	.	75.500	.	77.200
JUN	86.600	79.600	77.900	77.800	78.300	77.700
JUL	91.200	82.700	83.700	83.700	83.200	82.900
AUG	85.200	72.800	79.600	72.500	73.200	73.000
SEP	92.900	76.000	78.000	77.700	77.600	77.400
OCT	99.900	89.000	84.800	85.200	86.900	90.000
NOV	109.800	98.700	.	.	.	.
DEC	91.800	80.200	79.600	79.800	79.600	79.200
CALCIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 100 (F2)		
MAY	32.200	32.600	.	31.200	.	31.600
JUN	30.000	30.600	30.400	30.800	30.800	30.600
JUL	33.500	35.000	35.300	34.900	34.200	34.900
AUG	30.000	29.900	BDL	30.900	31.300	31.200
SEP	34.600	33.000	33.400	33.400	33.800	34.400
OCT	39.600	39.500	35.500	36.700	36.100	36.900
NOV	43.500	43.500	.	.	.	.
DEC	31.400	31.800	32.200	31.600	32.000	31.800
CHLORIDE (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 250 (A3)		
MAY	9.500	11.400	.	9.900	.	10.300
JUN	9.300	11.100	10.500	10.600	10.600	10.600
JUL	13.800	18.200	20.300	19.500	19.600	18.400
AUG	9.000	12.100	12.200	11.900	11.800	11.600
SEP	15.800	16.500	17.400	17.000	16.800	16.700
OCT	13.700	16.600	16.300	16.300	16.200	16.200
NOV	12.100	14.300	.	.	.	.
DEC	9.400	10.900	11.200	10.900	10.800	10.700
COLOUR (HZU)			DET'N LIMIT = 0.5	GUIDELINE = 5 (A3)		
MAY	BDL	.500 <T	.	3.000	.	BDL
JUN	.500 <T	BDL	.500 <T	.500 <T	1.000 <T	BDL
JUL	2.000 <T	BDL	.500 <T	BDL	.500 <T	.500 <T
AUG	2.000 <T	.500 <T	BDL	BDL	BDL	BDL
SEP	4.000	.500 <T	BDL	BDL	BDL	.500 <T
OCT	8.500	1.500 <T	.500 <T	BDL	.500 <T	1.500 <T
NOV	5.000	1.000 <T	.	.	.	.
DEC	2.000 <T	BDL	BDL	BDL	.500 <T	BDL
CONDUCTIVITY (UMHO/CM)			DET'N LIMIT = 1.	GUIDELINE = 400 (F2)		
MAY	245	260	.	246	.	250
JUN	235	243	239	239	240	239
JUL	269	289	300	298	295	289
AUG	235	243	260	243	244	243
SEP	282	271	280	279	276	276
OCT	297	300	290	292	294	297
NOV	305	319	.	.	.	.
DEC	248	253	253	251	250	249

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
DISS ORG CARBON (MG/L)			DET'N LIMIT = .100	GUIDELINE = 5.0 (A3)		
MAY	1.900	1.700	.	1.500	.	1.700
JUN	1.900	1.500	1.500	1.400	1.400	1.600
JUL	2.100	1.800	2.100	1.900	1.800	1.900
AUG	1.900	1.500	2.600	1.500	1.200	1.200
SEP	2.500	1.600	2.100	2.000	1.700	1.700
OCT	.100 <T	.500	2.500	1.800	2.000	1.600
NOV	2.300	1.700	.	.	.	.
DEC	1.600	1.200	1.700	1.200	1.200	1.200
FLUORIDE (MG/L)			DET'N LIMIT = 0.01	GUIDELINE = 2.4 (A1)		
MAY	.100	.080	.	.060	.	.060
JUN	.080	.100	.280	BDL	.080	.060
JUL	.120	.120	.120	.120	.100	.100
AUG	.080	.080	.080	.080	.080	.060
SEP	.120	.080	.080	.080	.080	.080
OCT	.120	.100	.100	.100	.100	.100
NOV	.100	.080	.	.	.	.
DEC	.080	.080	.080	.080	.080	.080
HARDNESS (MG/L)			DET'N LIMIT = 0.5	GUIDELINE = 80-100 (A4)		
MAY	113.000	116.000	.	110.000	.	113.000
JUN	108.000	109.000	108.000	109.000	108.000	108.000
JUL	120.300	126.300	127.600	126.700	123.900	125.300
AUG	108.600	108.500	BDL	109.800	110.300	109.000
SEP	124.000	118.000	121.000	119.000	120.000	122.000
OCT	137.400	137.200	123.600	128.000	125.800	128.800
NOV	148.700	149.700	.	.	.	.
DEC	111.000	112.000	113.000	112.000	112.000	113.000
IONCAL (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = N/A		
MAY	.354	.819	.	1.186	.	.193
JUN	.185	.720	.418	.793	2.088	.184
JUL	.152	1.811	.617	.234	1.582	1.202
AUG	2.969	2.255	4.834	3.241	2.957	1.786
SEP	.051	.277	.950	.295	.150	2.050
OCT	5.109	4.681	.518	1.455	.942	1.037
NOV	4.963	2.188	.	.	.	.
DEC	1.940	.514	.757	.611	.484	.440
LANGELIERS INDEX (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = N/A		
MAY	.378	.102	.	.124	.	.138
JUN	.331	.180	.089	.044	.087	.051
JUL	.328	.187	.171	.197	.217	.237
AUG	.374	-.119	.	-.026	.073	.041
SEP	.315	.152	.165	.043	.169	.106
OCT	.419	.207	.143	.149	.190	.183
NOV	.538	.400	.	.	.	.
DEC	.241	-.084	-.042	-.048	-.013	-.058

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
MAGNESIUM (MG/L)			DET'N LIMIT = 0.1	GUIDELINE = 30 (F2)		
MAY	8.100	8.300	.	7.700	.	8.200
JUN	8.000	7.900	7.800	7.800	7.600	7.700
JUL	8.900	9.500	9.600	9.600	9.400	9.250
AUG	8.200	8.200	BDL	7.950	7.800	7.550
SEP	9.100	8.600	9.000	8.800	8.700	8.800
OCT	9.400	9.400	8.500	8.800	8.700	8.850
NOV	9.750	9.800	.	.	.	.
DEC	7.900	8.000	7.900	8.000	7.900	8.100
SODIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 200 (A4)		
MAY	5.000	5.400	.	4.600	.	4.800
JUN	5.200	5.200	5.200	5.000	5.300	5.100
JUL	7.600	8.600	9.800	9.200	9.200	8.800
AUG	5.700	6.000	60.400	5.700	5.700	5.300
SEP	8.200	7.200	8.600	7.600	7.200	7.400
OCT	7.800	7.600	7.800	7.700	7.500	7.700
NOV	6.600	6.400	.	.	.	.
DEC	5.600	5.600	5.600	5.600	5.600	5.400
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = 0.05 (F2)		
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	BDL	BDL	BDL	BDL
JUL	.010	.002 <T	.002 <T	BDL	.004 <T	.002 <T
AUG	.020	.002 <T	.014	.006 <T	.008 <T	.006 <T
SEP	.024	BDL	.034	BDL	.012	.006 <T
OCT	.002 <T	.002 <T	.006 <T	.004 <T	.010	.004 <T
NOV	.002 <T	.002 <T	.	.	.	.
DEC	.014	BDL	.066	.008 <T	BDL	BDL
NITRITE (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = 1 (A1)		
MAY	.012	BDL	.	.001 <T	.	.001 <T
JUN	.007	.001 <T	.004 <T	.005	.006	.006
JUL	.012	.002 <T	.002 <T	.003 <T	.005	.003 <T
AUG	.004 <T	BDL	.002 <T	.001 <T	.001 <T	BDL
SEP	.001 <T	BDL	.001 <T	.001 <T	.002 <T	.002 <T
OCT	.007	BDL	.001 <T	BDL	.001 <T	BDL
NOV	.011	.001 <T	.	.	.	.
DEC	.007	BDL	.001 <T	.004 <T	.001 <T	BDL
TOTAL NITRATES (MG/L)			DET'N LIMIT = 0.005	GUIDELINE = 10 (A1)		
MAY	.690	.745	.	.565	.	.625
JUN	.410	.465	.455	.455	.445	.465
JUL	.695	.810	.910	.900	.875	.805
AUG	.325	.325	.325	.305	.310	.295
SEP	.850	.610	.685	.675	.660	.630
OCT	1.060	1.010	.870	.900	.925	.950
NOV	1.430	1.560	.	.	.	.
DEC	.570	.565	.570	.580	.535	.535

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
NITROGEN TOT KJELD (MG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A		
MAY	.220	.090 <T	.	.110	.	.120
JUN	.270	.120	.180	.170	.150	.200
JUL	.320	.320	.260	.180	.220	.220
AUG	.270	.100	.290	.190	.140	.120
SEP	.320	.150	.310	.180	.160	.160
OCT	.350	.220	.260	.230	.210	.200
NOV	.300	.210	.	.	.	.
DEC	.180	.090 <T	.310	.120	.110	.100
PH (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)		
MAY	8.340	8.120	.	8.170	.	8.170
JUN	8.330	8.210	8.130	8.080	8.120	8.090
JUL	8.270	8.160	8.140	8.170	8.200	8.210
AUG	8.380	7.960	8.200	8.040	8.130	8.100
SEP	8.240	8.180	8.180	8.060	8.180	8.110
OCT	8.260	8.100	8.100	8.090	8.130	8.100
NOV	8.300	8.210	.	.	.	.
DEC	8.200	7.930	7.970	7.970	8.000	7.960
PHOSPHORUS FIL REACT (MG/L)			DET'N LIMIT = 0.0005	GUIDELINE = N/A		
MAY	.035	BDL	.	.	.	.
JUN	.002 <T	BDL	.	.	.	.
JUL	.000 <T	BDL	.	.	.	.
AUG	.001 <T	.000 <T	.	.	.	.
SEP	.003	BDL	.	.	.	.
OCT	.003	.000 <T	.	.	.	.
NOV	.006	.000 <T	.	.	.	.
DEC	.002 <T	BDL	.	.	.	.
PHOSPHORUS TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = .40 (F2)		
MAY	.024	BDL	.	.	.	.
JUN	.015	BDL	.	.	.	.
JUL	.022	.003 <T	.	.	.	.
AUG	.015	BDL	.	.	.	.
SEP	.019	BDL	.	.	.	.
OCT	.020	.003 <T	.	.	.	.
NOV	.021	.002 <T	.	.	.	.
DEC	.013	BDL	.	.	.	.
SULPHATE (MG/L)			DET'N LIMIT = .200	GUIDELINE = 500 (A3)		
MAY	18.740	30.200	.	28.300	.	28.140
JUN	16.950	23.150	23.460	23.540	26.230	23.630
JUL	22.480	30.050	31.130	31.230	31.060	29.620
AUG	17.740	26.620	26.300	26.920	27.030	26.830
SEP	22.610	30.310	31.590	31.120	31.100	30.910
OCT	22.990	29.670	29.180	29.850	29.310	29.320
NOV	22.410	33.490	.	.	.	.
DEC	17.650	26.430	25.850	26.420	26.130	26.600
TURBIDITY (FTU)			DET'N LIMIT = 0.05	GUIDELINE = 1 (A1)		
MAY	23.000	.500	.	.350	.	.370
JUN	8.700	.260	.670	.800	.710	1.500
JUL	10.200	.280	.350	.420	.690	.210 <T
AUG	4.200	.270	1.510	.350	.550	.350
SEP	7.900	.240 <T	.440	.180 <T	.330	.450
OCT	7.000	.220 <T	.430	.590	.910	.410
NOV	8.500	.310	.	.	.	.
DEC	5.700	.300	.420	.340	.290	.370

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
METALS						
ALUMINUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 100 (A4)		
MAY	170.000	39.000	.	33.000	.	32.000
JUN	110.000	110.000	89.000	94.000	97.000	97.000
JUL	150.000	92.000	87.000	83.000	72.000	78.000
AUG	60.000	87.000	38.000	75.000	63.000	68.000
SEP	120.000	46.000	47.000	47.000	46.000	44.000
OCT	130.000	58.000	49.000	49.000	55.000	50.000
NOV	98.000	26.000	.	.	.	.
DEC	76.000	19.000	26.000	19.000	20.000	17.000
ARSENIC (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 25 (A1)		
MAY	.660 <T	.160 <T	.	.200 <T	.	.150 <T
JUN	.580 <T	.170 <T	BDL	.140 <T	.270 <T	.160 <T
JUL	.760 <T	.340 <T	.360 <T	.350 <T	.380 <T	.220 <T
AUG	.950 <T	.410 <T	.200 <T	.220 <T	.380 <T	.320 <T
SEP	.430 <T	.380 <T	BDL	.150 <T	.300 <T	.140 <T
OCT	.810 <T	.430 <T	.390 <T	.370 <T	.380 <T	.330 <T
NOV	.800 <T	.600 <T	.	.	.	.
DEC	.550 <T	.180 <T	.250 <T	.280 <T	.150 <T	.230 <T
BARIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 1000 (A2)		
MAY	17.000	16.000	.	15.000	.	15.000
JUN	16.000	15.000	15.000	15.000	15.000	15.000
JUL	18.000	19.000	19.000	19.000	18.000	18.000
AUG	15.000	16.000	.180 <T	16.000	17.000	17.000
SEP	22.000	19.000	19.000	19.000	19.000	19.000
OCT	20.000	18.000	18.000	17.000	17.000	17.000
NOV	18.000	16.000	.	.	.	.
DEC	15.000	14.000	15.000	14.000	14.000	13.000
BORON (UG/L)			DET'N LIMIT = 2.00	GUIDELINE = 5000 (A1)		
MAY	42.000	39.000	.	39.000	.	39.000
JUN	21.000	21.000	22.000	21.000	20.000 <T	21.000
JUL	30.000	31.000	31.000	33.000	32.000	30.000
AUG	26.000	23.000	23.000	23.000	24.000	23.000
SEP	37.000	31.000	25.000	32.000	34.000	34.000
OCT	27.000	26.000	27.000	25.000	26.000	23.000
NOV	20.000 <T	20.000 <T	.	.	.	.
DEC	18.000 <T	18.000 <T	18.000 <T	18.000 <T	18.000 <T	17.000 <T
BERYLLIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 6800 (D4)		
MAY	.090 <T	BDL	.	.070 <T	.	.080 <T
JUN	BDL	BDL	BDL	BDL	BDL	.060 <T
JUL	BDL	BDL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL	BDL	BDL
SEP	BDL	BDL	BDL	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL	BDL	BDL
NOV	BDL	BDL	.	.	.	.
DEC	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CADMIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)		
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	BDL	BDL	BDL	BDL
JUL	BDL	BDL	.070 <T	BDL	.080 <T	BDL
AUG	BDL	.060 <T	BDL	.120 <T	BDL	.060 <T
SEP	BDL	BDL	.080 <T	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL	.140 <T	BDL
NOV	BDL	BDL	.	.	.	.
DEC	BDL	BDL	.190 <T	BDL	BDL	BDL
COBALT (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A		
MAY	.170 <T	.070 <T	.	.040 <T	.	.070 <T
JUN	.140 <T	.090 <T	BDL	.030 <T	BDL	BDL
JUL	.210 <T	.070 <T	.060 <T	.060 <T	.070 <T	.070 <T
AUG	.110 <T	.090 <T	.090 <T	.300 <T	.070 <T	.090 <T
SEP	.220 <T	.280 <T	.250 <T	.400 <T	.230 <T	.240 <T
OCT	.220 <T	.140 <T	.160 <T	.150 <T	.140 <T	.140 <T
NOV	.150 <T	.080 <T	.	.	.	.
DEC	.150 <T	.090 <T	.090 <T	.080 <T	.180 <T	.070 <T
CHROMIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 50 (A1)		
MAY	2.800 <T	2.300 <T	.	2.200 <T	.	2.200 <T
JUN	1.700 <T	1.400 <T	2.200 <T	1.500 <T	1.600 <T	1.500 <T
JUL	2.700 <T	2.000 <T	2.100 <T	2.100 <T	2.000 <T	1.800 <T
AUG	1.000 <T	.850 <T	.800 <T	.840 <T	.990 <T	1.000 <T
SEP	3.400 <T	2.300 <T	.890 <T	2.400 <T	2.900 <T	2.800 <T
OCT	1.200 <T	.950 <T	1.000 <T	.780 <T	1.000 <T	BDL
NOV	1.200 <T	1.000 <T	.	.	.	.
DEC	1.600 <T	1.600 <T	1.600 <T	1.500 <T	1.800 <T	1.600 <T
COPPER (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 1000 (A3)		
MAY	1.200 <T	.750 <T	.	4.000 <T	.	2.900 <T
JUN	1.200 <T	.510 <T	51.000	3.300 <T	30.000	5.700
JUL	2.600 <T	.830 <T	12.000	3.300 <T	47.000	5.600
AUG	1.900 <T	BDL	35.000	8.000	27.000	4.300 <T
SEP	1.200 <T	.540 <T	41.000	6.400	28.000	6.100
OCT	1.500 <T	.850 <T	29.000	5.000 <T	76.000	4.600 <T
NOV	1.400 <T	.970 <T	.	.	.	.
DEC	.880 <T	.560 <T	41.000	4.800 <T	30.000	5.400
IRON (UG/L)			DET'N LIMIT = 6.00	GUIDELINE = 300 (A3)		
MAY	220.000	6.400 <T	.	BDL	.	BDL
JUN	180.000	BDL	BDL	BDL	12.000 <T	BDL
JUL	250.000	BDL	BDL	BDL	7.500 <T	BDL
AUG	87.000	BDL	BDL	BDL	9.100 <T	7.100 <T
SEP	180.000	20.000 <T	15.000 <T	BDL	19.000 <T	16.000 <T
OCT	160.000	BDL	BDL	BDL	39.000 <T	17.000 <T
NOV	130.000	BDL	.	.	.	.
DEC	110.000	BDL	7.200 <T	6.300 <T	27.000 <T	11.000 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
MERCURY (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = 1 (A1)		
MAY	BDL	BDL	.	.	.	.
JUN	.030 <T	BDL	.	.	.	.
JUL	BDL	BDL	.	.	.	.
AUG	BDL	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
OCT	BDL	BDL	.	.	.	.
NOV	BDL	BDL	.	.	.	.
DEC	BDL	BDL	.	.	.	.
MANGANESE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (A3)		
MAY	9.900	1.300	.	.800	.	1.100
JUN	8.700	.720	.680	.670	1.100	.760
JUL	11.000	.340 <T	.460 <T	.360 <T	.740	.580
AUG	5.500	.220 <T	.260 <T	.400 <T	.890	1.300
SEP	6.500	.350 <T	.360 <T	.400 <T	1.200	2.500
OCT	5.600	.260 <T	.380 <T	.300 <T	3.300	2.600
NOV	4.100	.570	.	.	.	.
DEC	2.600	.410 <T	.730	.570	3.000	.770
MOLYBDENUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A		
MAY	.400 <T	.720	.	.570	.	.630
JUN	.440 <T	.660	.620	.680	.660	.640
JUL	.690	1.200	1.200	1.300	1.200	1.100
AUG	.550	.630	.650	.640	.590	.630
SEP	.810	1.000	1.100	1.100	1.000	.960
OCT	.880	1.200	1.200	1.100	1.000	1.200
NOV	.670	.780	.	.	.	.
DEC	.490 <T	.540	.630	.630	.540	.530
NICKEL (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 350 (D3)		
MAY	1.300 <T	1.000 <T	.	1.000 <T	.	1.000 <T
JUN	.330 <T	BDL	2.800	BDL	1.100 <T	BDL
JUL	1.200 <T	.560 <T	3.200	.670 <T	.610 <T	BDL
AUG	.730 <T	.270 <T	1.500 <T	.770 <T	.750 <T	.210 <T
SEP	1.400 <T	2.000 <T	3.100	1.900 <T	2.300	2.200
OCT	.900 <T	.600 <T	1.100 <T	2.000 <T	.740 <T	.670 <T
NOV	.520 <T	BDL	.	.	.	.
DEC	.550 <T	.450 <T	1.500 <T	1.100 <T	.910 <T	.630 <T
LEAD (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 10. (A1)		
MAY	.700	.060 <T	.	.280 <T	.	.170 <T
JUN	.490 <T	BDL	2.000	.420 <T	3.700	.470 <T
JUL	1.100	.080 <T	.930	.380 <T	6.700	.590
AUG	.240 <T	BDL	2.000	1.200	4.000	.610
SEP	.390 <T	.080 <T	2.100	.500 <T	3.300	.750
OCT	.340 <T	BDL	1.600	.350 <T	20.000	.580
NOV	.450 <T	.060 <T	.	.	.	.
DEC	.280 <T	BDL	1.800	.320 <T	5.900	.350 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
ANTIMONY (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 146 (D4)		
MAY	.290 <T	.340 <T	.	.390 <T	.	.430 <T
JUN	.330 <T	.390 <T	.460 <T	.460 <T	.370 <T	.360 <T
JUL	.510	.420 <T	.570	.510	.460 <T	.320 <T
AUG	.490 <T	.540	.500 <T	1.500	.470 <T	.540
SEP	.440 <T	.400 <T	.710	1.400	.580	.510
OCT	.320 <T	.390 <T	.560	.490 <T	.550	.440 <T
NOV	.360 <T	.520	.	.	.	.
DEC	.460 <T	.440 <T	.590	.560	.450 <T	.450 <T
SELENIUM (UG/L)			DET'N LIMIT = 1.0	GUIDELINE = 10 (A1)		
MAY	BDL	1.600 <T	.	1.600 <T	.	1.400 <T
JUN	BDL	BDL	BDL	1.300 <T	1.700 <T	1.100 <T
JUL	BDL	BDL	1.500 <T	1.600 <T	1.600 <T	1.700 <T
AUG	BDL	1.900 <T	1.200 <T	1.200 <T	1.100 <T	1.600 <T
SEP	BDL	1.800 <T	1.100 <T	BDL	2.200 <T	1.900 <T
OCT	BDL	BDL	BDL	BDL	BDL	BDL
NOV	1.100 <T	BDL	.	.	.	.
DEC	BDL	BDL	BDL	1.100 <T	1.300 <T	BDL
STRONTIUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = N/A		
MAY	110.000	120.000	.	110.000	.	110.000
JUN	110.000	110.000	110.000	110.000	110.000	110.000
JUL	150.000	160.000	170.000	160.000	170.000	160.000
AUG	120.000	120.000	.680 <T	110.000	120.000	120.000
SEP	190.000	160.000	170.000	170.000	170.000	160.000
OCT	160.000	160.000	150.000	150.000	150.000	150.000
NOV	140.000	130.000	.	.	.	.
DEC	110.000	110.000	110.000	110.000	110.000	110.000
TITANIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = N/A		
MAY	6.800	4.800 <T	.	4.600 <T	.	4.900 <T
JUN	7.000	4.800 <T	4.800 <T	4.700 <T	4.700 <T	4.300 <T
JUL	4.400 <T	2.900 <T	2.800 <T	3.300 <T	2.800 <T	3.000 <T
AUG	5.000 <T	3.900 <T	1.600 <T	4.200 <T	4.200 <T	4.000 <T
SEP	6.700	4.800 <T	4.800 <T	4.900 <T	4.600 <T	4.600 <T
OCT	4.400 <T	2.200 <T	2.200 <T	2.100 <T	2.200 <T	2.100 <T
NOV	4.900 <T	3.200 <T	.	.	.	.
DEC	3.400 <T	2.300 <T	2.600 <T	2.400 <T	2.200 <T	2.500 <T
URANIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (A1)		
MAY	.370 <T	.060 <T	.	BDL	.	.080 <T
JUN	.300 <T	.130 <T	.090 <T	.080 <T	.080 <T	.100 <T
JUL	.410 <T	.180 <T	.130 <T	.140 <T	.130 <T	.140 <T
AUG	.200 <T	.060 <T	BDL	BDL	.060 <T	BDL
SEP	.460 <T	.080 <T	.080 <T	.100 <T	.070 <T	.060 <T
OCT	.560	.310 <T	.210 <T	.220 <T	.180 <T	.240 <T
NOV	.500 <T	.290 <T	.	.	.	.
DEC	.290 <T	.090 <T	.110 <T	.070 <T	.080 <T	.080 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
VANADIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A		
MAY	.610	.230 <T	.	.190 <T	.	.250 <T
JUN	.520	.300 <T	.260 <T	.280 <T	.340 <T	.270 <T
JUL	.830	.450 <T	.430 <T	.460 <T	.480 <T	.420 <T
AUG	.500 <T	.590	.590	.550	.490 <T	.530
SEP	.750	.690	.680	.650	.570	.680
OCT	.630	.520	.480 <T	.520	.580	.470 <T
NOV	.410 <T	.670	.	.	.	.
DEC	.280 <T	.510	.540	.520	.490 <T	.500 <T
ZINC (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 5000 (A3)		
MAY	3.100	1.300 <T	.	2.000 <T	.	1.800 <T
JUN	2.700	1.800 <T	16.000	2.700	48.000	2.700
JUL	140.000	1.600 <T	6.400	1.800 <T	23.000	2.500
AUG	1.900 <T	1.600 <T	18.000	9.700	23.000	2.500
SEP	2.000 <T	1.300 <T	13.000	2.100	10.000	2.700
OCT	2.700	1.400 <T	14.000	3.300	22.000	2.500
NOV	3.600	3.300	.	.	.	.
DEC	1.800 <T	.860 <T	25.000	3.100	12.000	2.300

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHLOROAROMATICS						
HEXACHLOROETHANE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 1900 (D4)		
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	!LA	.	BDL	.	!LA
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	.	.	.
DEC	BDL	1.000 <T	.	2.000 <T	.	2.000 <T
HEXACHLOROCYCLOPENTADIENE (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = 206000 (D4)		
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	45.000 <T	.	.	.	.
DEC	BDL	BDL	.	BDL	.	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PESTICIDES & PCB						
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 700 (G)		
MAY	2.000 <T	BDL	.	4.000 <T	.	2.000 <T
JUN	BDL	!LA	.	BDL	.	!LA
JUL	2.000 <T	BDL	.	1.000 <T	.	1.000 <T
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	1.000 <T	1.000 <T	.	.	.	.
DEC	1.000 <T	2.000 <T	.	1.000 <T	.	1.000 <T
LINDANE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 4000 (A1)		
MAY	BDL	BDL	.	1.000 <T	.	BDL
JUN	BDL	!LA	.	BDL	.	!LA
JUL	1.000 <T	BDL	.	BDL	.	1.000 <T
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	.	.	.
DEC	BDL	BDL	.	BDL	.	BDL
ATRAZINE (NG/L)			DET'N LIMIT = 50	GUIDELINE = 60000 (A2)		
MAY	BDL	BDL	.	.	.	.
JUN	BDL	BDL	.	.	.	.
JUL	90.000 <T	60.000 <T	.	.	.	.
AUG	60.000 <T	BDL	.	.	.	.
SEP	250.000 <T	140.000 <T	.	.	.	.
OCT	200.000 <T	160.000 <T	.	.	.	.
NOV	BDL	BDL	.	.	.	.
DEC	BDL	BDL	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PHENOLICS (UG/L)	PHENOLICS		DET'N LIMIT = 0.2	GUIDELINE = 2 (A4)		
MAY	BDL	BDL	.	.	.	.
JUN	BDL	BDL	.	.	.	.
JUL	.400 <T	BDL	.	.	.	.
AUG	INR	BDL	.	.	.	.
SEP	.400 <T	BDL	.	.	.	.
OCT	1.000 <T	.400 <T	.	.	.	.
NOV	BDL	.600 <T	.	.	.	.
DEC	.800 <T	.600 <T	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
VOLATILES						
BENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)		
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	.100 <T	.	.100 <T	.	.100 <T
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	.	.	.
DEC	BDL	BDL	.	BDL	.	BDL
TOLUENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 24 (A3)		
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	.100 <T	.	.100 <T	.	BDL
JUL	BDL	.100 <T	.	.150 <T	.	.150 <T
AUG	BDL	.100 <T	.	.050 <T	.	.050 <T
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	.	.	.
DEC	BDL	BDL	.	BDL	.	BDL
ETHYLBENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)		
MAY	BDL	.050 <T	.	BDL	.	BDL
JUN	BDL	.050 <T	.	.100 <T	.	BDL
JUL	BDL	.100 <T	.	.050 <T	.	.050 <T
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	.100 <T	.	BDL	.	BDL
OCT	BDL	.050 <T	.	BDL	.	BDL
NOV	BDL	BDL	.	.	.	.
DEC	BDL	.050 <T	.	BDL	.	BDL
STYRENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (D1)		
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	.050 <T	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	.	.	.
DEC	BDL	BDL	.	BDL	.	BDL
CHLOROFORM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)		
MAY	.200 <T	19.000	.	16.000	.	18.500
JUN	.100 <T	31.800	.	26.200	.	29.200
JUL	.300 <T	36.600	.	37.600	.	38.700
AUG	.100 <T	27.000	.	27.900	.	27.400
SEP	.100 <T	30.600	.	28.300	.	29.700
OCT	.300 <T	47.000	.	51.100	.	43.800
NOV	.100 <T	34.100	.	.	.	.
DEC	.100 <T	17.600	.	19.000	.	19.600

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
111, TRICHLOROETHANE (UG/L)		DET'N LIMIT = 0.02		GUIDELINE = 200 (D1)		
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	.040 <T	BDL	.	BDL	.	BDL
NOV	.040 <T	BDL	.	.	.	.
DEC	BDL	BDL	.	BDL	.	BDL
CARBON TETRACHLORIDE (UG/L)		DET'N LIMIT = 0.20		GUIDELINE = 5 (A1)		
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	1.400 <T	.	1.600 <T	.	1.800 <T
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	.	.	.
DEC	BDL	BDL	.	BDL	.	BDL
DICHLOROBROMOMETHANE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 350 (A1+)		
MAY	BDL	9.850	.	8.650	.	9.700
JUN	BDL	11.900	.	10.050	.	11.250
JUL	.050 <T	14.400	.	14.450	.	15.800
AUG	BDL	13.750	.	13.550	.	13.950
SEP	.050 <T	12.750	.	12.600	.	12.600
OCT	.100 <T	14.650	.	14.700	.	13.950
NOV	BDL	11.900	.	.	.	.
DEC	BDL	8.250	.	8.350	.	8.800
CHLORODIBROMOMETHANE (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 350 (A1+)		
MAY	.100 <T	3.500	.	3.100	.	3.500
JUN	BDL	3.800	.	3.300	.	3.700
JUL	BDL	4.000	.	4.100	.	5.000
AUG	BDL	5.200	.	5.000	.	5.300
SEP	BDL	3.300	.	3.500	.	3.400
OCT	BDL	2.700	.	2.500	.	2.600
NOV	BDL	2.500	.	.	.	.
DEC	BDL	2.400	.	2.600	.	2.400
BROMOFORM (UG/L)		DET'N LIMIT = 0.20		GUIDELINE = 350 (A1+)		
MAY	BDL	.400 <T	.	.200 <T	.	.400 <T
JUN	BDL	.200 <T	.	.200 <T	.	.200 <T
JUL	BDL	.200 <T	.	.200 <T	.	.200 <T
AUG	BDL	.400 <T	.	.400 <T	.	.600 <T
SEP	BDL	.200 <T	.	.200 <T	.	.200 <T
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	.	.	.
DEC	BDL	BDL	.	BDL	.	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM TECUMSEH WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
TOTL TRIHALOMETHANES (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = 350 (A1)		
MAY	BDL	32.750	.	27.950	.	32.100
JUN	BDL	47.800	.	39.850	.	44.450
JUL	BDL	55.300	.	56.450	.	59.700
AUG	BDL	46.450	.	46.950	.	47.200
SEP	BDL	46.900	.	44.600	.	45.950
OCT	BDL	64.350	.	68.300	.	60.350
NOV	BDL	48.450	.	.	.	.
DEC	BDL	28.300	.	29.950	.	30.850

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE	
BACTERIOLOGICAL				
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0	(A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML	(A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A	
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML	(A1)
CHEMISTRY (FLD)				
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A	
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A	
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A	
FIELD PH	DMNSLESS	N/A	6.5-8.5	(A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0	(A3)
FIELD TURBIDITY	FTU	N/A	1.0	(A1)
CHEMISTRY (LAB)				
ALKALINITY	MG/L	0.2	30-500	(A3)
AMMONIUM TOTAL	MG/L	0.002	0.05	(F2)
CALCIUM	MG/L	0.2	100	(F2)
CHLORIDE	MG/L	0.2	250	(A3)
COLOUR	TCU	0.5	5.0	(A3)
CONDUCTIVITY	UMHO/CM	1.0	400	(F2)
CYANIDE	MG/L	0.001	0.2	(A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0	(A3)
FLUORIDE	MG/L	0.01	2.4	(A1)
HARDNESS	MG/L	0.5	80-100	(A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A	
MAGNESIUM	MG/L	0.1	30.0	(F2)
NITRITE	MG/L	0.001	1.0	(A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A	
PH	DMNSLESS	N/A	6.5-8.5	(A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A	
PHOSPHORUS TOTAL	MG/L	0.002	0.4	(F2)
SODIUM	MG/L	0.2	200	(A4)
SULPHATE	MG/L	0.2	500	(A3)
TOTAL NITRATES	MG/L	0.005	10.0	(A1)
TURBIDITY	FTU	0.05	1.0	(A1)
CHLOROAROMATICS				
123 TRICHLOROBENZENE	NG/L	5.0	N/A	
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A	
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A	
124 TRICHLOROBENZENE	NG/L	5.0	10000	(I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000	(D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A	
236 TRICHLOROTOLUENE	NG/L	5.0	N/A	
245 TRICHLOROTOLUENE	NG/L	5.0	N/A	
26A TRICHLOROTOLUENE	NG/L	5.0	N/A	
HEXACHLOROBENZENE	NG/L	1.0	10	(C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450	(D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000	(D4)
HEXACHLOROETHANE	NG/L	1.0	1900	(D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A	
PENTACHLOROBENZENE	NG/L	1.0	74000	(D4)
CHLOROPHENOLS				
234 TRICHLOROPHENOL	NG/L	100.0	N/A	
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A	
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A	

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
24-DICHLORORPHENOXYBUTYRIC ACID (24-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALLATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHLYENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake,

discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL
This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P) VOLATILES

CLASS: HEALTH METHOD: POCODO UNIT: µg/L

SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	µg/L	AL
CDWG C	87/01			5.000	µg/L	MAC
EPA C	87/07			5.000	µg/L	MCL
EPAA C	80/11			6.600	µg/L	AMBIENT **
FERC C	84/05			1.000	µg/L	MCL
WHO C	84/01			10.000	µg/L	GV

DESCRIPTION:**NAME:** BENZENE

CAS#: 71-43-2

MOLECULAR FORMULAE: C_6H_6

DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L

SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27). CYCLOHEXATRIENE (41).

CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).

PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41). THRESHOLD ODOUR: 0.5 - 10 PPM IN WATERTHRESHOLD TASTE: 0.5 mg/L IN WATER (39).
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).

SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45); MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:
MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle -fill bottle completely without bubbles
Organics (OWOC),(OWTRI),(OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -when 'special pesticides' are requested three extra bottles must be filled

Cyanide	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (**Caution:** NaOH is corrosive)
Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($K_2Cr_2O_7$) (**Caution:** HNO_3&$K_2Cr_2O_7$ are corrosive)
Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

<u>Steps:</u>

1. Let sampling water tap run for an adequate time to clear the sample line.

2. Record time of day on submission sheet.

3. Record temperature on submission sheet.

4. Fill up all bottles as per instructions.

5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water) .

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do not rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked

Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (**Caution:** HNO_3 is corrosive)
Volatiles (duplicate) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics (OWOC) (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top

<u>Steps:</u>

1. Record time of day on submission sheet.

2. Let cold water flow for five minutes.

3. Record temperature on submission sheet.

4. Fill all bottles as per instructions.

5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.